

U.S. DEPARTMENT OF AGRICULTURE

FLOOD CONTROL
FIELD COORDINATING COMMITTEES
18 & 20

PRELIMINARY EXAMINATION REPORT
SANTA YNEZ RIVER

In compliance with
Section 6 of the Flood Control Act, June 22, 1936
Public No. 738 - 74th Congress
as amended June 28, 1938
Public No. 761 - 75th Congress

Lawrence - #86835

REGIONAL WATER CONSERVATION DISTRICT

751 GLE
751 GLE

6/12/40

ACCOPRESS BINDER

No. BF 250

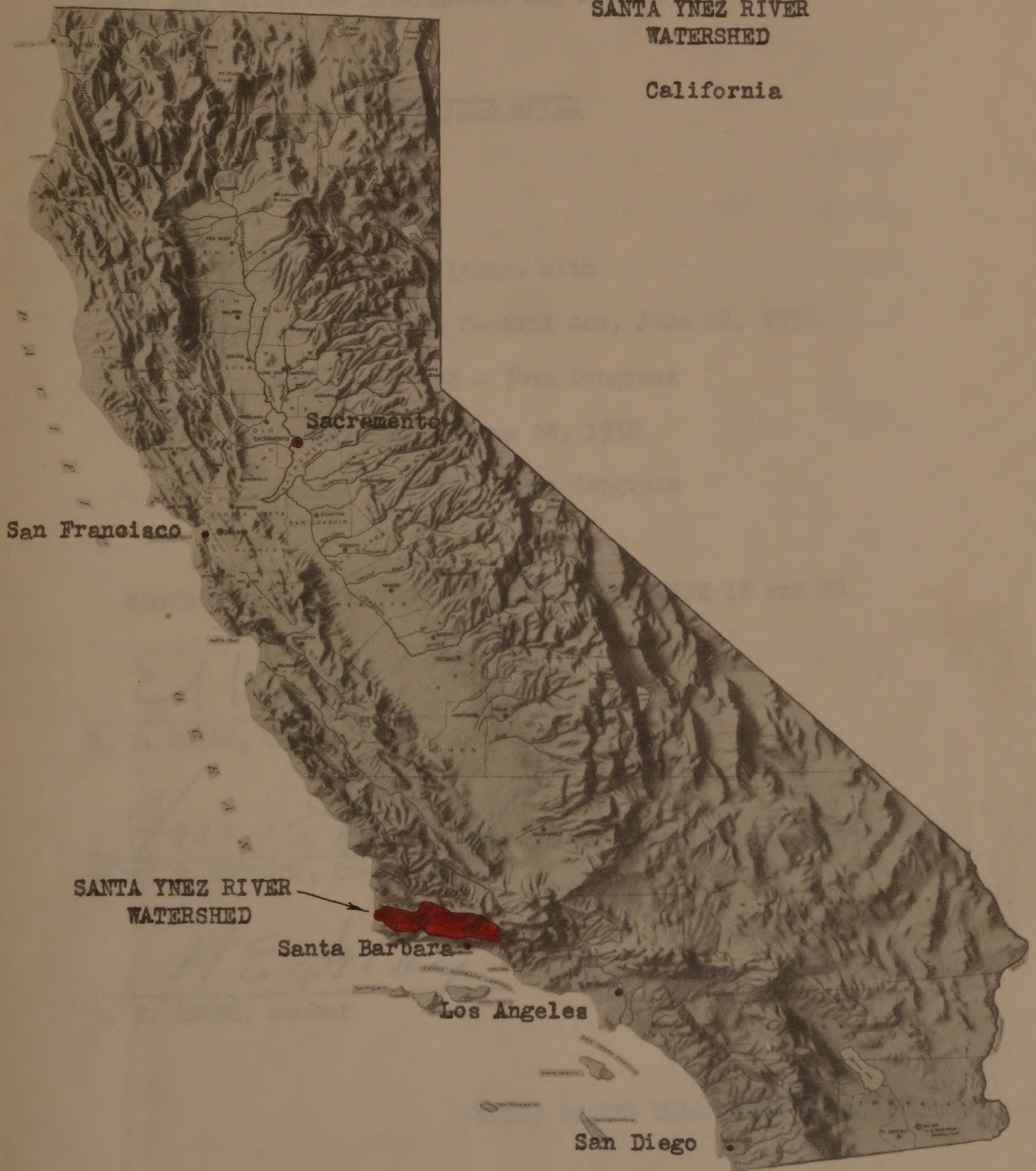
Made by ACCO PRODUCTS, INC.
Long Island City, N. Y., U. S. A.

PRELIMINARY EXAMINATION REPORT

SANTA YNEZ RIVER

LOCATION
OF
SANTA YNEZ RIVER
WATERSHED

California



PRELIMINARY EXAMINATION REPORT

Runoff and Waterflow Retardation and Soil Erosion Prevention

SANTA YNEZ RIVER

In compliance with

Section 6 of the Flood Control Act, June 22, 1936

Public No. 738 - 74th Congress

As amended June 28, 1938

Public No. 761 - 75th Congress

FLOOD CONTROL FIELD COORDINATING COMMITTEES 18 and 20

E. I. Kotok

E. I. KOTOK, Co-Chairman

Forest Service

Harry E. Reddick

HARRY E. REDDICK, Co-Chairman

Soil Conservation Service

H. E. Selby

H. E. SELBY, Member

Bureau of Agricultural Economics

UNITED STATES DEPARTMENT OF AGRICULTURE

June 4, 1940

Authority

This report of preliminary examination is made in compliance with the Flood Control Act of June 22, 1936, Public No. 738 -- 74th Congress, as amended June 28, 1938, Public 761 -- 75th Congress, as follows:

"Section 6 -- The Secretary of Agriculture is authorized and directed to cause preliminary examinations and surveys for runoff and waterflow retardation and soil erosion prevention on the watersheds of the Santa Ynez River."

SYLLABUS

1. Field examinations and facts presented at the public hearing on flood control of the Santa Ynez River reveal that a flood problem does exist, that it has become increasingly serious in recent years, that the application of upstream measures for runoff water-flow retardation and soil erosion prevention is technically feasible and probably justified by anticipated benefits, and that the future welfare and existence of the cities of Santa Barbara and Montecito and surrounding agricultural areas depend to a major degree on the proper management of this watershed and the equitable adjudication of the water originating therein.

2. Severe acceleration of erosion has followed extensive denudation of the upper basin by forest fires, resulting in excessive sedimentation rates in the Gibraltar and Juncal reservoirs, which provide the main water supply for Santa Barbara and Montecito. This denudation has also accelerated overland flow in the high mountain regions, thereby contributing to higher flood stages in the lower Santa Ynez drainage. Clean cultivation of extensive agricultural lands in the middle and lower watershed units has caused acceleration of hillside erosion, with attendant downstream deposition damages in localized areas, and trenching of tributary valleys. This has increased surficial runoff and aggravated flood conditions in the lower watershed.

3. Immediate authorization for a detailed survey is recommended.

TABLE OF CONTENTS

	<u>Page</u>
I. DESCRIPTION	1
II. OCCUPANCY AND ECONOMY	5
III. HYDROLOGY	10
IV. FLOOD AND EROSION DAMAGE	13
V. PROJECTS OF OTHER AGENCIES	18
VI. BASIC FLOOD SOURCE AREAS	23
VII. REMEDIAL MEASURES	24
VIII. RECOMMENDATIONS	26

TABLES

1. Natural cover, land use and ownership, Santa Ynez watershed	4
2. Fire history, 1911-1938, Santa Ynez watershed	8
3. Precipitation stations, Santa Ynez drainage	10a
4. Summary of streamflow records, Santa Ynez	11a
5. Streamflow records, Santa Ynez drainage	11b
6. Flood and siltation damages resulting from flood flows of the 1937-1938 season, Santa Ynez drainage	14
7. Reduced capacity resulting from deposition of silt in reservoirs of Santa Ynez watershed as of 1938	14a
8. Annual damage loss because of reservoir siltation as of 1938. Santa Ynez watershed	14a

PHOTOGRAPHS

	<u>Page</u>
Topography and natural cover	27
Geology	28
Burned areas	29
Reservoir silting	30-32
Flood damage	33-34
Cultivated areas	35

MAPS

Frontispiece	Location diagram
1	Relief map showing watershed boundary, physiographic units and national forest area.
2	Natural cover and land use
3	Fire history
4	Flooded areas, precipitation and stream gaging stations, and isohy- etals of average annual rainfall
5	Critical erosion areas

I. DESCRIPTION

Location and Boundaries (Frontispiece and Map 1)

4. The Santa Ynez River Watershed, comprising approximately 890 square miles, is located within the southern half of San Bernardino County. The watershed is roughly rectangular in shape with an east and west length of about 70 miles and a north and south width of 12 to 15 miles. The boundaries are well defined on the north and south by the San Rafael and the Santa Ynez mountain ranges, elevation 3000 to 7000 and 3000 to 4000 feet, respectively. These ranges unite on the east to form a rugged mountain block which constitutes the headwaters in which the Santa Ynez River rises and flows westerly to enter the Pacific Ocean north of Point Arguello.

Physiography (Map 1, and photographs, page 27)

5. The watershed may be divided into three natural physiographic divisions or units, termed upper, middle, and lower. The upper unit is composed entirely of rugged mountains characterized by precipitous slopes and fault scarps. These mountains extend into the middle unit to form the north and south boundaries and to surround broad valley lands and foothills of gentle gradient. The lower unit contains broken to rugged hills of low elevation which are interrupted only by the broad Santa Ynez flood plain between Lompoc and the ocean. The upper unit contains 360 square miles (43 percent of the watershed) extending from the Ventura divide or eastern extremity of the watershed to the mouth of Cachuma Creek; the middle unit, 285 square miles (33 percent of the watershed) from Cachuma Creek to about 3 miles below Buellton; and the lower unit,

I. DESCRIPTION

Location and Boundaries (Frontispiece and Map 1)

4. The Santa Ynez River Watershed, comprising approximately 890 square miles, is located within the southern half of Santa Barbara County. The watershed is roughly rectangular in shape with an east and west length of about 70 miles and a north and south width of 12 to 15 miles. The boundaries are well defined on the north and south by the San Rafael and the Santa Ynez mountain ranges, elevation 3000 to 7000 and 3000 to 4000 feet, respectively. These ranges unite on the east to form a rugged mountain block which constitutes the headwaters in which the Santa Ynez River rises and flows westerly to enter the Pacific Ocean north of Point Arguello.

Physiography (Map 1, and photographs, page 27)

5. The watershed may be divided into three natural physiographic divisions or units, termed upper, middle, and lower. The upper unit is composed entirely of rugged mountains characterized by precipitous slopes and fault scarps. These mountains extend into the middle unit to form the north and south boundaries and to surround broad valley lands and foothills of gentle gradient. The lower unit contains broken to rugged hills of low elevation which are interrupted only by the broad Santa Ynez flood plain between Lompoc and the ocean. The upper unit contains 382 square miles (43 percent of the watershed) extending from the Ventura divide or eastern extremity of the watershed to the mouth of Cachuma Creek; the middle unit, 280 square miles (31 percent of the watershed) from Cachuma Creek to about 3 miles below Buellton; and the lower unit,

228 square miles (26 percent of the watershed) from about 3 miles below Buellton to the Pacific Ocean.

Geology and Soils (Photographs, page 28)

6. The San Rafael and Santa Ynez mountain ranges are composed of hard, well consolidated sandstone with interbedded shale. The shales are highly fractured and are extremely unstable. Several bodies of chalk-like material are included within the mountain zone and these contribute excessive amounts of erosion debris. The Mono Creek drainage, tributary to Gibraltar Reservoir, has a predominance of the more unstable formations, while the eastern portion of the area draining into Juncal is composed more largely of the more competent hard rock groups. A band of highly unstable decomposed serpentine extends southeastward from about the center of the northern boundary of the area to Gibraltar Dam occupying a zone between the mountainous and foothill areas. This material is subject to sloughing and does not support sufficient vegetation to maintain effective stabilization. Several major east-west trending faults and numerous minor ones have produced steep escarpments that are subject to severe geologic erosion.

7. The foothill areas within the middle and lower physiographic units are comprised of semi- to loosely consolidated deposits that are particularly susceptible to deep gullying. The soils are usually characterized by compact clay subsoils that hinder water penetration and increase erosion hazards. Valley areas within these two units consist of deep alluvial fill material relatively permeable and highly fertile.

8. Throughout the middle and upper physiographic units there are local areas of deep adobe soil, locally called potrereros, varying in size from a few to several hundred acres. Such areas are generally stable and are not significant as flood and erosion sources except as erosion may be accelerated locally by overgrazing or by concentration of runoff from roads.

Natural Cover (Map 2. Photographs, page 27)

9. Chaparral is the dominant plant cover of the Santa Ynez watershed. It is a climax type of shrubs and small trees that make a typically impenetrable cover. The principal species are chamise, California lilac, manzanita and scrub oak. Chaparral occupies 51 percent of the watershed area (452 square miles) and it covers virtually all of the upper physiographic unit. It also dominates mountain slopes of the middle unit and appears in large areas of the lower unit. Similar to the chaparral but of smaller stature and more open growth is the sagebrush type which dominates 51 square miles in the lower unit, or approximately 6 percent of the whole drainage area. These two types are highly inflammable, but are of greatest value in protecting watershed land against surficial runoff and erosion, and have secondary value as browse for livestock.

10. Before settlement by the white man in the early 1870's, grassland and oak-woodland-grass occupied nearly all of the area not covered by chaparral and sagebrush, or some 375 square miles (42 percent of the watershed). Since then, as settlement has become more intensive, larger areas of valley lands and foothill slopes have been brought under cultivation, until at the present time there remain only 217 square miles of grassland and oak-woodland-grassland types.

11. A pine and pine-fir forest type is found locally along the highest ridges of the San Rafael range and in the early days a small area on the slopes of Figueroa Mountain was cut over. Today, no commercial stand of timber is in the watershed, so this type is significant only to recreation.

12. The extent and use of the watershed, arranged by type of natural cover, in order of areal extent, are shown in Table 1.

Table 1.- Natural cover and land use
Santa Ynez Watershed

Cover type	: Square : miles	: Percent : of : watershed	: : Principal use
Chaparral	452	51	Water production, grazing, recreation.
Grassland, oak- woodland-grass	217	24	Grazing
Cultivated	158	18	Agriculture
Sagebrush	58	7	Grazing
Pine & pine-fir	4	--	Recreation
Barren	<u>1</u> 890	<u>--</u> 100	--

General Erosion Conditions (Map 5. Photographs, pages 29, 35)

13. Areas of severe erosion are distributed throughout the watershed, the most serious of which lie on lands near the head of the watershed within the 200 square mile drainage tributary to Gibraltar Reservoir. Serious erosion also occurs on cultivated and range lands of the middle and lower physiographic units. These areas are more local in nature however and contribute less to the general

flood problem than those in the upper watershed. Geologic erosion is most extensive in the headwaters area.

II. OCCUPANCY AND ECONOMY

Historical Development

14. Settlement of the region began with the establishment of La Purissima Concepcion Mission in 1787, near the present town of Lompoc. Grazing of cattle and sheep was the predominant land use until the first American settlers entered the region about 1870. Production of wheat, barley, and corn followed. Subsequent developments in transportation and irrigation have made possible wide diversification of agriculture in the lower valleys, centered in the fertile area near Lompoc.

Population and Land Tenure

15. Population of the Santa Ynez watershed was estimated from the census of 1935 to be 7,707 persons, classified as follows:

Rural	2,223 persons
Rural non-farm	558 "
Urban (settlement of 100 persons or more)	<u>4,926</u> "
	7,707

16. The urban population is concentrated in the lower and middle units of the drainage basin with three-fourths of this population residing in the town of Lompoc, about 8 miles inland from the ocean. The principal communities of Solvang, Santa Ynez, White Hills, Los Olivos and Buellton contain less than 300 population each. Most of the rural as well as the urban population is engaged in agriculture or in agricultural industries in the immediate vicinity of the various communities.

17. About 62 percent of the watershed area is privately owned, of which 3 percent is patented land within national forest boundaries. The remainder, or 38 percent, is divided between federal and state ownership, federal (Los Padres National Forest) comprising 37 percent and state ownership 1 percent.

18. A large proportion of the farm land, particularly in the lower valley, is tenant operated, according to the 1935 Census of Agriculture, which lists 41 percent of all farm operators as tenants or share croppers who rented approximately 42 percent of all farm land.

Land Use and Land Values

19. There are three major classes of land use, namely agriculture, grazing and water production. The agricultural use is for the most part confined to the valley portions of the middle and lower physiographic units. The important crops are sugar beets, lima beans, alfalfa, vegetables, mustard and flower seeds. The mustard seed industry is distinctive to this area and is practically a commercial monopoly.

20. A tabulation of the crop land harvested during the census year 1934 follows. This represents 13 percent of the land in farms or a little less than half the total cultivable land in farms.

<u>Item</u>	<u>Acres</u>	<u>Percent</u>
Grains, hay and threshed	14,614	37
Legumes, for hay, including alfalfa	3,719	9
Row crops, beans, beets, potatoes, etc.	12,680	32
Vegetables, strawberries	3,330	8
Orchards and vineyards	561	2
All other crops	<u>5,020</u>	<u>12</u>
Total crop land harvested	39,924	100

21. Grazing of beef and dairy cattle is carried on over most of the uncultivated lands in the lower and middle, and in a small portion of the upper physiographic units. Dairying is an important industry, and the city of Santa Barbara and neighboring coastal cities obtain their milk supply from dairies in the Santa Ynez valley. The numbers of principal livestock in the Santa Ynez watershed, as of January 1935, were as follows:

Horses and mules	2,429
Cows milked	2,967
Beef cattle	31,728
Sheep and lambs	4,516

22. Use of the watershed in the areas above Juncal and Gibraltar reservoirs is for water production, to the exclusion of virtually all other uses including grazing, mineral entries and private acquisition. Entry for recreational purposes is allowed only on foot or horseback under a rigid permit system, administered by the U. S. Forest Service. Only a few original settlers and some long-time permittees live in the area.

23. The aggregate value of all farm land and buildings was approximately \$14,700,000, according to the U. S. Census of Agriculture in 1935. Intensively cultivated land in the vicinity of Lompoc is valued at from \$500 to \$1000 per acre. Improved river bottom land in the middle watershed is valued at from \$150 to \$250 per acre. Mesa land under cultivation ranges from \$50 to \$100 per acre, and that of grazing land in the foothills from about \$1.00 to \$5.00 per acre.

Fire History (Map 3. Photographs, page 29)

24. Incomplete records show that from 1911 to 1938 at least

287 square miles or 32 percent of the entire watershed has been burned over; however, in the upper unit approximately 63 percent has been burned over during this period. Areas twice burned amounted to 15 square miles, or 2 percent of the watershed area, while 1 square mile has burned 3 times within this period of record. The largest and most serious fires have occurred in the upper physiographic unit in a type of vegetation which is highly inflammable, and through which fires spread rapidly over large areas. Control in this area is particularly difficult due to inaccessibility and ruggedness of the region, and this has been recognized by the Forest Service in recent replanning for fire protection requirements in this area, in which they have found it necessary to plan for 15-minute control, due to high hazards and values involved.

25. A summary of the fire history is contained in Table 2 following. The relation of fire to accelerated erosion and runoff is discussed in Chapter IV.

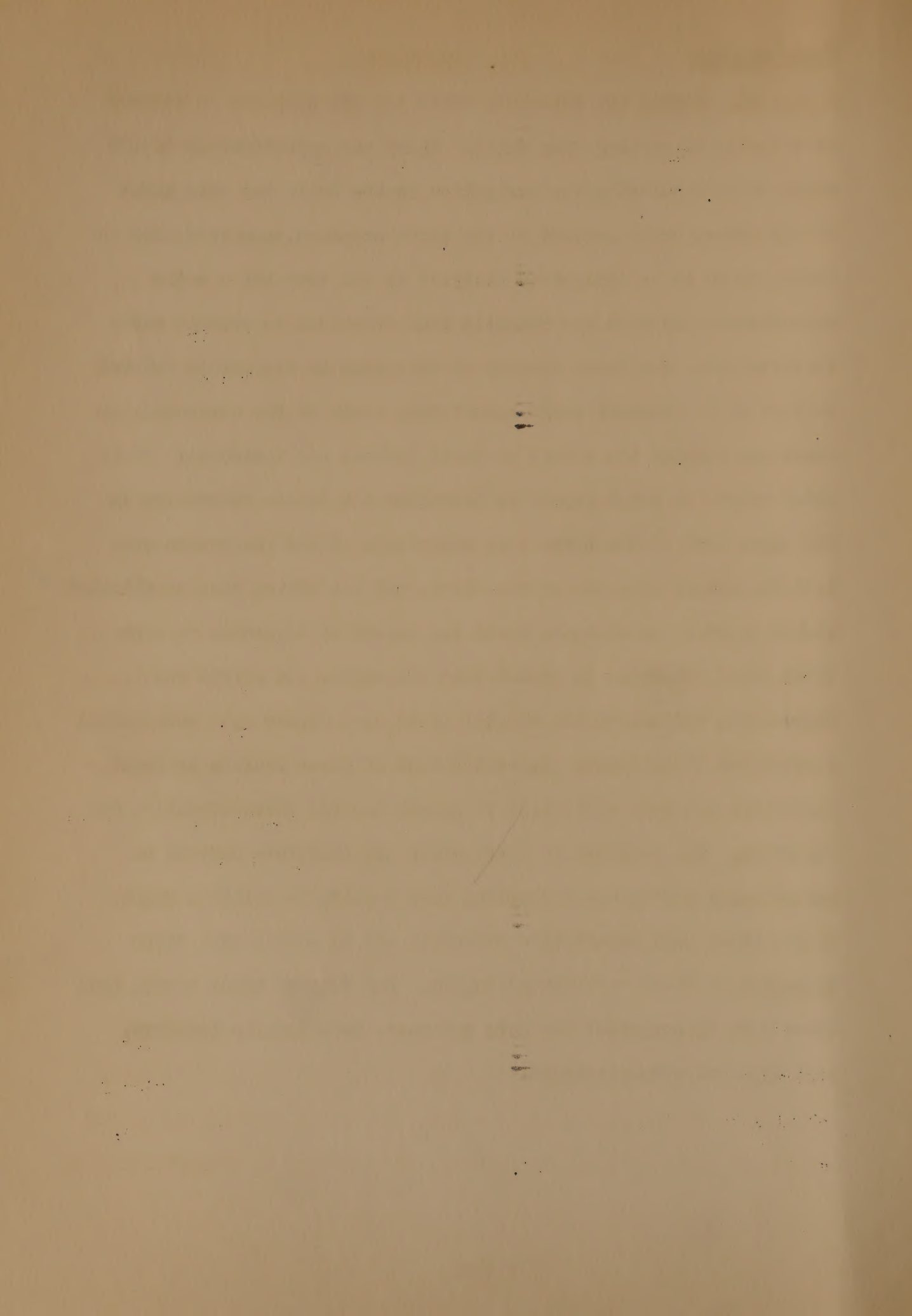
Table 2.- Fire history, 1911-1938, Santa Ynez watershed

<u>Times burned</u>	<u>Square miles</u>	<u>Percent of watershed area</u>
Once	271	30
2 times	15	2
3 times	<u>1</u>	<u>--</u>
Total area burned	287	32
<u>Individual fires</u>		
1911-20	11	1
1921-30	198	22
1931-38	<u>98</u>	<u>11</u>
Total	307	34

Practically all of the fires which have occurred in this area were man-caused.

Water Economy

26. Within the watershed water for all purposes is secured principally by pumping from wells. There are approximately 30,000 acres of land suitable for irrigation in the basin but only about 10,675 acres, or 27 percent of the total cropland, were irrigated in 1935. There is no irrigation district in the area but a water conservation district has recently been organized to promote water conservation. The water economy of this area is intimately related to that of the coastal plain immediately south of the watershed, in which are located the cities of Santa Barbara and Montecito. Their chief source of water supply is Gibraltar and Juncal reservoirs in the upper part of the Santa Ynez watershed. These reservoirs control the runoff from 200 square miles, and the cities have established rights by court order which limit the amount of diversion to that which would otherwise be wasted into the ocean. La Goleta and Carpenteria valleys on the coastal plain also depend upon underground sources for their water. Replenishment of these sources by local runoff has not been sufficient to permit desired diversification and expansion. The ranchers in these areas are therefore anxious to secure supplemental water supplies from outside to maintain water levels which will permit this expansion and to combat salt water intrusion in their underground supply. The duty of water varies from about 1 to $2\frac{1}{2}$ acre-feet per acre per year, depending on location, soil type and crops produced.



III. HYDROLOGY

Precipitation (Map 4)

27. The average seasonal precipitation over this basin ranges from about 10 inches near the ocean to 35 inches along the high mountains of the headwater areas. It occurs chiefly in the form of rain during the winter months from December through March. The higher mountains experience occasional snow storms in winter and thunder showers during the summer months, but the extent of such precipitation is limited and has no appreciable bearing on the flood control problem.

28. Prior to 1938 no published data were available on rainfall intensities within the watershed. During 1938 an intensity gage was installed at Santa Ynez by the Soil Conservation Service. Four intensity gages are proposed for installation in the near future by the U. S. Weather Bureau Hydrologic Unit, either within or closely adjacent to the watershed. These are Figueroa Mountain, Cuyama, Surf, and Big Pine Mountain. Table 3 gives information pertinent to precipitation stations within or adjacent to this watershed.

29. The major portion of the seasonal water supply is received during the winter and spring months with a minimum during the late summer and early fall.

Streamflow

30. Streamflow in the Santa Ynez River varies widely with the seasons and from winter to summer. During low rainfall seasons when summer irrigation draft is heavy, the entire surface stream may disappear except at bedrock controls. Winter flow is characterized by

SANTA YNEZ DRAINAGE
PRECIPITATION STATIONS

April 1940

Note: Average annual precipitation and snowfall at stations operating at date of compilation is to the year July, 1939 unless otherwise indicated.

No. :	Station	Elev.	Records		Length.Yr.	Average Seasonal		Maximum 24 Hr. Precipitation, Inches	Date	Period ^{1/}	Remarks
			Begin	Last		Precip.	Snowfall				
1	Santa Barbara	130	1867	date	71	18.12		6.95	Jan. 25, '14	41	Weather Bur.Sta.
2	Lompoc ^{2/}	100	1910	date	28	14.35					S.P.Milling Co.
3.	Gibraltar Dam	1375	1919	date	19	24.33					City Sta.Barbara
4	Los Alamos	579	1909	date	29	14.20		5.81	Feb. 20, '18	30	Weather Bur.Sta.
5	Ozena (Cuyama)	3700	1904	date	34	10.25		7.70	Feb. 20, '14	34	Weather Bur.Sta.
6	Pt. Conception	50	1895	date	43	14.41					at Lighthouse
7	Surf	50	1926	date	12	10.85					S.P.R.R.
8	Buellton	350	1930	date	7	21.35					City Santa Barbara
9	San Marcos Pass	2200	1897	date	36	30" ⁺					Not continuous
10	S. Portal Mission Tunnel	1200	1928	date	9	21.44					Cty.Santa Barbara
11	Juncal Dam	2200	1930	date	9	31.09					Montecito Co.W.D.
12	Ballard	700	1928	date	10	15.88					Private Record
13	San Julian Rancho	1000	1878	date	61	24.17					Private Record
<u>INTENSITY GAGES EXISTING</u>											
1	Santa Ynez		1938	date							S.C.S.
<u>INTENSITY GAGES PROPOSED</u>											
1	Figueroa Mountain ^{3/}										U.S.W.B. Hydro-logic unit
	Cuyama ^{2/}										
	Surf (Pt. Arguello)										
	Big Pine Mt. (Alternate Potrero Seco)										

Above data from "Flood Investigation Report of the Santa Ynez River"
by Santa Barbara County Road Dept. Dec. 1938 and Weather Bureau Records.

- ^{1/} Number of years for which maximum 24 hr. intensity precipitation records are available.
- ^{2/} SCS operates 6 standard gages in connection with project.
- ^{3/} Gages being installed at time of report.

torrential floods of short duration which are caused by high intensity rainfall over the watershed.

31. Streamflow measurements were begun more than 30 years ago at Gibraltar and near Lompoc and about 8 years ago at Juncal, Santa Ynez and Solvang. None of these records are continuous except the one for the Juncal station, but there are periods in which they overlap. This overlapping will permit estimates of the flow during periods of missing records.

32. The records of streamflow are summarized in Table 4, which lists the gaging stations, the operating agency, the period for which records are available, watershed area, seasonal runoff and flood peaks. Seasonal records are contained in Table 5, which presents the total flow and maximum 24-hour and momentary flood peaks by individual stations for the various seasons of record.

Flood History

33. According to testimony presented at the public hearing, destructive floods have occurred during the 55-year period of historical record as follows: Feb. 1884, Jan. 1890, Jan. 1907, during the seasons of 1908-09, 1910-11, Jan. 1914, March 1918 and March 1938. Thus from historical record, 8 floods have occurred during 55 years or at a frequency of one in 7 years.

34. Streamflow records are tabulated on Table 5. From data contained in this table it is noted that the 24-hour maximum runoff rate during the 1937-38 season (24,760 c.f.s. at Lompoc) was exceeded in 1913-14 (30,800 c.f.s.) and again in 1914-15 (32,500 c.f.s.). The 24-hour maxima for the seasons of 1906-07 and 1908-09 are not

STREAM FLOW RECORDS
SANTA YNEZ DRAINAGE BASIN

July, 1939

No.	Gaging Station	Agency	Records Available	Water-shed Area in Sq. mi.	Seasonal Runoff in Acre Feet			Flood Peaks in C.F.S.		
					Maximum	Minimum	Average	24 Hour Record	Average of Annual Max.	Momentary Average of Annual Max. Greatest
1	Santa Ynez River at Juncal Res.	U.S.G.S.	1930-date	17	16,330	272	5,090	1,240	540	4,162 ^{2/}
2	Santa Ynez River nr. Santa Barbara (Gibraltar Dam)	U.S.G.S.	1903-08 1910-18 1920-date	219	260,890 ^{1/}	1030	55,200 ^{1/}	9,450	3188	38,174 ^{2/}
3	Santa Ynez River below Gibraltar Dam	U.S.G.S.	1920-date		Spillway discharge and reservoir releases only				10,920 ^{2/}	35,461 ^{2/}
4	Santa Ynez River near Santa Ynez	U.S.G.S.	1928-31 1932-date	435	554,280 ^{1/}	1	115,000 ^{1/}	17,910	4363	43,700
5	Santa Ynez River at Solvang	U.S.G.S.	1928-36 5-11/37	585	--	--	--	--	--	12,300
6	Santa Ynez River nr. Lompoc (Robinson Bridge)	U.S.G.S.	1906-18 1925-date	790	815,000 ^{1/}	2390	176,000 ^{1/}	32,500	9089	50,100 13,856
7	Mono Creek at Mono Damsite	U.S.G.S.	1903-04	119				711		
8	Mission Tunnel nr. Santa Barbara	U.S.G.S.	1912-17							

^{1/} From Estimated Annuals.

^{2/} From U.S.E.D. Preliminary Report Santa Ynez River

TABLE 5
STREAMFLOW RECORDS SANTA YNEZ DRAINAGE
based upon Estimates and USGS Records
(Estimated Seasonal flows from Quinton, Code & Hill - Leeds and Barnard Report)

Season	Santa Ynez at Juncal 17 sq. mi.			Santa Ynez near S.B. (Gibraltar) 219 sq. mi.			Santa Ynez near Santa Ynez 435 sq. mi.			Santa Ynez near Solvang 585 sq. mi.			Santa Ynez near Lompoc 790 sq. mi.		
	Seasonal Acre Ft.	Max. 24-hr. c.f.s.	Max. Mom. c.f.s.	Seasonal Acre Ft.	Max. 24-hr. c.f.s.	Max. Mom. c.f.s.	Seasonal Acre Ft.	Max. 24-hr. c.f.s.	Max. Mom. c.f.s.	Seasonal Acre Ft.	Max. 24-hr. c.f.s.	Max. Mom. c.f.s.	Seasonal Acre Ft.	Max. 24-hr. c.f.s.	Max. Mom. c.f.s.
04-05				118,240	7,275								369,280		
1905-06				82,930	4,810								265,450		
06-07				236,950	9,450								743,160		
07-08				76,620	--								239,000		
08-09				260,890	--								815,750		
09-10				53,510	--								164,430	11,000	
1910-11				170,940	--								533,000	20,400	
11-12				16,950	--								50,400	588	
12-13				17,030	1,780								47,400	4,470	
13-14				136,990	8,500	13,100							546,000	30,800	41,800
14-15				63,520	2,360								395,000	32,500	41,500
1915-16				82,460									258,000	15,000	---
16-17				44,500	2,500								137,000	5,500	---
17-18				94,420									320,000	14,400	15,700
18-19				4,580									15,170		
19-20				11,940									31,380		
1920-21				6,500	256								13,610		
21-22				68,440	2,523								199,050		
22-23				8,690	495								21,850		
23-24				2,430	163								5,910		
24-25				3,100	318								4,760	39	39
1925-26				47,780	7,245								90,100	8,340	9,870
26-27				52,320	6,600								134,000	10,400	13,600
27-28				8,570	850								30,800	2,150	2,150
28-29				3,700	232		3,460			7,700	169		9,770	181	1,520
29-30				3,090	234		3,110	270		6,650	296		5,780	260	396
1930-31	272			1,030	67		1.2	--		3,160	18		2,390	53	---
31-32	5,550	933		44,070	5,690		--	--		110,000	12,300		142,000	12,800	22,600
32-33	1,750	507		8,180	1,150		11,600	140		17,200	709		17,700	859	1,930
33-34	2,450	625		13,330	3,210		17,170	3,200		21,470	3,400		24,170	3,040	4,280
34-35	2,630	154		23,540	1,160		42,220	1,920		55,040	2,560	4,180	56,830	2,300	2,980
1935-36	1,920	89		15,450	716		30,740	1,540	1,890	40,490	2,360	2,700	40,820	1,880	2,530
36-37	9,870	235		79,180	3,000		156,600	5,560	7,990	3,290	52	--	209,000	7,320	10,700
37-38	16,330	1,240		123,750	9,130		273,300	17,910	43,700	---	---	---	352,400	24,760	50,100
38-39	1,750	--		13,570	580		18,700	825	1,410	---	---	---	32,960	1,927	1,500

available, but photographs on page 34 together with newspaper accounts of these floods indicate that the high water equalled and possibly exceeded that of March 1938. Extremely high total flows are recorded for these seasons, as will be noted from streamflow records. It therefore appears that five floods have occurred during the 35-year period of actual flow records of equal or greater magnitude than the 1938 flood, a frequency of one flood (1938 proportion or larger) in 7 years. According to studies made by the Corps of Engineers, U. S. Army, in their Preliminary Examination Report, a so-called maximum flood of a magnitude possibly exceeding twice that of the 1938 flood could be expected once in 100 years.

Groundwater

35. Water for irrigation in the lower valleys is obtained principally from wells with a limited amount of irrigation by direct diversion. Progressive lowering of the water table has not been apparent, although there is considerable seasonal fluctuation, particularly in dry years when the underground basin is subjected to heavy pumping draft and recharge is at a minimum.

36. The percolation beds in the lower valleys are extensive enough to permit recharge of the underground aquifers from which irrigation water is secured by pumping; however, it is believed that the future efficiency of these percolation beds will depend to a considerable extent on the initiation of a program of erosion prevention on the watershed, agricultural and grazing lands and on the continuing desilting effect of the upstream reservoirs.

IV. FLOOD AND EROSION DAMAGE

Flood Damage (Map 4. Photographs, pages 33, 34).

37. The lower valleys are the principal flood damage areas.

Inundation has resulted in destruction of valuable agricultural land by removal of fertile top soil or the deposition of unproductive silt and sand on farm land while stream bank erosion has destroyed much land adjacent to the channel. Possibility of far greater losses from future floods is expected because of the closer settlement and more intensive farm land use, particularly in the Lompoc delta area of the Santa Ynez River.

38. Damage from floods in the spring of 1938 was the greatest in the recorded history of the Santa Ynez River. Losses from the flood are given in table 6 and areas inundated are shown on map 4. No attempt has been made to include losses occasioned by interruption of transportation facilities, loss of business and income, and hazards to health incident to pollution of the water supply of the area. Damages listed do not include loss of county income resulting from the 1938 flood. Reductions in assessments approximating 50 percent of the damages to individual properties in this area were made after the flood.

Table 6.- Flood and siltation damages resulting from
flood flows of the 1937-38 season.
Santa Ynez watershed. 1/

		: Percent
		: of total
		: Damages: damages
First class land totally destroyed, 355 acres at \$400	\$142,000	42
First class land 50 percent destroyed, 100 " " \$200	20,000	6
First class land (washed and debris) 4,000 " " \$ 10	40,000	12
Crops destroyed or damaged, 2,500 acres at \$20	50,000	15
Marginal land destroyed or damaged, 1000 acres at \$30	30,000	9
Improvements and equipment	15,000	4.5
Roads and bridges	8,000	2.5
Utilities	1,000	-
Forest roads and trails, Los Padres National Forest	25,000	7.5
Miscellaneous	5,000	1.5
Total	\$336,000	100

1/ Does not include loss of storage capacity in reservoirs because accurate figures are not available for this particular flood. The annual loss is estimated at \$29,500 as listed in table 7.

Santa Barbara County Road Department. 1938. Flood investigation report of the Santa Ynez River. p. 12. Los Padres National Forest office records, and Santa Barbara city records.

39. Loss of storage capacity in reservoirs because of silting is recognized as a damage intimately related to water runoff and erosion in the upper watershed. Available data provide an accurate basis for determination of this loss on an annual basis which is estimated at \$29,500. These data are given in tables 7 and 8.

40. In addition to the direct losses, there are indirect damages such as pollution of water supplies, physical and mental hazards due to floods and losses because of interruption of business and communications. County income suffered because of the necessity of reduction of assessments in the Lompoc areas following the 1938

Table 7.- Reduced capacity resulting from deposition of silt in reservoirs of Santa Ynez watershed as of 1938.

	Gibraltar storage reservoir	Mono debris basin	Caliente debris basin	Juncal storage reservoir
Date of completion	1920	1936	1937	1930
Original cost (dollars)	900,000 ^{1/}	147,000	75,000	866,650 ^{1/}
Capacity at date of completion (acre-feet)	14,500	624	480	7,228
Cost per acre-foot of original capacity (dollars)	62	235	156	120
Loss of capacity to date due to siltation (percent)	37	100	36	4
Loss in capacity due to silta- tion (acre-feet)	5,330	624	174	299

^{1/} Cost of aqueducts for diversion not included, which were:
Gibraltar to Santa Barbara, \$400,000; Juncal to Montecito,
\$527,861.

Table 8.- Annual damage loss because of reservoir siltation as of 1938.
Santa Ynez watershed.

Reservoir system	Siltation in system			Annual damage
	: Acre- : feet	: Period : years	: Rate : acre-feet/year	
Gibraltar-Mono-Caliente	6128	18	340	\$25,500 ^{1/}
Desilting Tunnel				400 ^{2/}
Juncal	300	10	30	3,600 ^{3/}
Total				\$29,500

- ^{1/} Based on replacement cost of \$75.00 per acre-foot to provide additional storage by raising Gibraltar Dam (\$3,000,000 for 40,000 acre-feet storage).
- ^{2/} Represents annual cost to desilt aqueduct tunnel.
- ^{3/} Based on cost of present storage - no increased storage contemplated.

flood. These reductions averaged approximately 50 percent of the damages to individual properties in this area.

41. Total annual flood and siltation damage to be expected in this watershed is \$77,500, consisting of average annual flood and siltation damage from flood waters based upon a 7 year flood expectancy, \$48,000 (table 6) and annual loss of storage in Gibraltar and Juncal reservoirs, \$29,500 (table 8).

Erosion Damage - Mountainous and Foothill Areas (Map 5)

42. The most serious erosion in the upper unit occurs inside national forest boundaries in an area that is largely tributary to Gibraltar and Juncal reservoirs. This condition is ascribed to (1) unusually high rates of geologic erosion, and (2) to periodic extensive denudation by fire.

43. The highly active geologic erosion is caused principally by steep, and in many cases, nearly vertical cliffs of unstable formations, that have failed to support enough vegetation to effect stabilization. Examples of such formations are shown in photographs, page 28.

44. As a result of burning, the plant cover has been severely depleted over large areas of rugged mountain slopes. This has contributed to accelerated sheet and gully erosion which has been an important source of the sediments now deposited in the Gibraltar and Juncal reservoirs. The effect of this sedimentation is discussed below under the heading of reservoir silting.

45. It is known that great quantities of erosion debris are deposited in the channels adjacent to source areas and in the main stream tributaries. These deposits are subject to further transportation

downstream, and will ultimately reach the reservoirs. In the event of the occurrence of a so-called maximum flood, the movement of this debris would be greatly accelerated and the life of the reservoirs correspondingly shortened.

46. Significant erosion also occurs in the lower and middle physiographic units. It is traceable to fire, improper methods of cultivation, and occasionally to overgrazing of range lands.

Erosion Damage - Agricultural Areas (Photographs, page 35)

47. Gully and sheet erosion are widespread and serious on steeply sloping, clean cultivated foothills of the lower and middle unit and on certain range lands in the lower unit, particularly between Solvang and Lompoc (map 5). Many small lateral valleys of the region are deeply trenched so that infertile sand is transported into the Lompoc Valley and deposited on valley bottom lands by floods. Much of the erosion damage is local and does not contribute to the flood problem in the main Santa Ynez, however a portion of the debris from certain areas, particularly from the Salsipuedes tributary drainage is carried into the Santa Ynez River which aggravates the flood problem.

48. A large acreage of gently rolling cultivated land in the middle and lower physiographic units is subject to moderate erosion, the erosion debris from which is largely shifted locally from one spot to another and does not reach the Santa Ynez River in significant quantities. Stabilization of the area would be more of an indirect rather than a direct flood control benefit.

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

THE UNIVERSITY OF CHICAGO PRESS

1960

Reservoir Silting

49. As previously stated, accelerated erosion in the upper Santa Ynez watershed is producing erosion debris which is rapidly depleting the water storage capacity of Gibraltar and Juncal reservoirs. Periodic measurements of silt deposition in these reservoirs as well as in the Agua Caliente and Mono debris reservoirs indicate the magnitude of the siltation problem and the extent of damages. These are listed together with other pertinent data in tables 7 and 8. Siltation damage in the watershed is included in table 6.

Gibraltar (Map 3. Photographs, pages 30, 31)

50. Denudation of 72 percent of the watershed area above Gibraltar Reservoir by forest fire since the construction of this dam is largely responsible for the accelerated erosion which has caused a high rate of storage loss (37 percent in 18 years). Deposition in this period totalled 5330 acre-feet of debris, an average of 1.46 acre-feet per square mile of watershed per year.

51. Two debris dams have been built in the main tributaries of Gibraltar reservoir to impound eroded materials and thus prolong the usefulness of Gibraltar dam. Mono debris dam was completed in December 1936 at a cost of \$147,000. The 624 acre-foot reservoir was filled to capacity during the second winter. Denudation of the protective cover by fire over a large portion of the watershed is largely responsible for the high erosion rate. Agua Caliente debris dam, completed in December 1937, represents an investment of \$75,000. Of the original 480 acre-feet storage capacity, 174 acre-feet had been occupied by silt to April 1939, a loss of 36 percent of the original storage capacity. The rate of silting is less than that

on the Mono Drainage because a smaller proportion of the area above the dam has been burned and the area is more stable geologically.

Juncal (Map 3, and photograph, page 32)

52. The storage capacity of Juncal reservoir was decreased by 299 acre-feet or 4 percent in the nine years following completion of the dam in 1929. This represents a deposition rate of 2.12 acre-feet per square mile per year, which is a greater rate than in Gibraltar reservoir. Denudation of the drainage area by fire has been the chief contributing cause of this high erosion rate. The entire drainage area has been burned since 1915, of which 32 percent has been burned twice, and 3 percent three times. Area of the Juncal watershed is 17 square miles. Mustard was planted as a cover crop in a portion of the area burned in 1932, but no permanent debris dams have been constructed.

V. PROJECTS OF OTHER AGENCIES

53. Projects of other agencies relating to flood control and water conservation in this drainage are as follows:

Corps of Engineers, U. S. Army

54. The Army preliminary examination report on the Santa Ynez River, dated July 26, 1939, recommended that survey report be authorized on the basis that a program for flood control, combined with water conservation, was apparently feasible and economically justified by the defined values for flood control and water conservation. The Board of Rivers and Harbors has withheld authority pending presentation by interested parties of additional data, statements and

arguments bearing on the necessity for the improvements recommended. The local interests have indicated to the Board that they desire to present additional data, and have requested an extension of time for preparation and presentation of such data.

Other Federal Agencies

55. Forest Service, cooperating with the City of Santa Barbara:

A. Revegetation of watershed areas denuded by forest fire in 1933; approximately 15,000 acres planted with mustard seed to form a protective cover crop.

B. Mono debris dam completed December, 1936, to protect Gibraltar reservoir from silting. Storage capacity 624 acre-feet completely filled in two winters. Cost approximately \$147,000.

C. Caliente debris dam completed December 1937, storage capacity 480 acre-feet, 36 percent filled in 1938. cost approximately \$75,000.

Cooperating with the City of Montecito:

D. Revegetation of watershed lands denuded by fire in 1932; approximately 10,000 acres planted with mustard seed for protective cover crop; construction of experimental check dams to retard the silting of Juncal reservoir.

E. Forest Service has a continuing program on Federally owned lands within the National Forest boundaries, involving not only protection against fire but administrative regulation of land use in the interests of reduction of erosion and perpetuation of the watershed cover

to maintain and increase water yield. Recent studies to determine the level of fire protection necessary have indicated that additional protection facilities, both in man power and physical improvement will be required to maintain and improve cover conditions.

56. Soil Conservation Service. By means of the Lompoc Camp the Soil Conservation Service has been cooperating with land owners of the lower unit in the conservation of soil and moisture resources. As of April 1, 1940, 33 cooperative agreements involving 18,134 acres of range and cultivated land have been entered into with private land owners. The Service cooperating with the Extension Service has developed two farm plans that provide for soil and moisture conservation on 509 acres of range and cultivated land in the middle unit of the watershed. Land owners in this watershed are at the present time taking steps to organize a soil conservation district that will embrace the entire Santa Ynez River watershed.

57. Farm Security Administration. The intensive single crop type of farming and the high land values in the lower valleys and the large livestock ranching units predominating in the grazing areas have sharply curtailed FSA activities in this watershed. This organization has only two clients in the area.

58. Farm Credit Administration. The Federal Land Bank has approximately 100 loans in this area. Only one foreclosure has been made and this was on a farm severely damaged by the 1938 flood. Aside from the fact that particular attention is given to flood

hazard on all loan appraisals, there are no restrictions on loans in this watershed.

59. Agricultural Adjustment Administration. Approximately 90 percent of the livestock ranchers (representing 50 percent of the ranch acreage) participate in the range improvement program. Principal emphasis is on deferred grazing and development of supplemental stock-watering facilities. Not over 20 percent of the crop land in the watershed is represented in the agricultural conservation program. Most of the participating acreage is wheat land, where mulching or cover crop programs constitute the major enterprise. The large number of small farms and considerable absentee ownership combine to limit participation.

60. County and Local Planning Committees. County and local land use planning committees have not been active in this area. County conferences, however, have been held but no intensive work has been undertaken. The county committee has appointed a group of seven members to work with the County Board of Supervisors on water resources and water uses in the county. Five members of this committee are from areas in or dependent upon water from the Santa Ynez Basin. The county committee has indicated strong support by increased fire protection throughout the local mountain country as one of the best means of protecting their water resources.

Local Agencies.

61. Gibraltar dam was completed by the city of Santa Barbara in 1920. Its storage capacity of 14,500 acre-feet is now 37 percent

lost through silting. It cost \$900,000 exclusive of tunnels and pipelines, which cost \$400,000. Enlargement of Gibraltar reservoir to total capacity of 50,000 acre-feet (includes 40,000 acre-feet new storage) is proposed by the city of Santa Barbara at an estimated cost of about \$3,000,000. Its purpose is chiefly water conservation, although flood control benefits could be obtained through proper operation.

62. Juncal dam was completed by the Montecito County Water District in 1930 at a cost of \$866,650 plus \$527,861 for aqueduct, with an original reservoir capacity of 7228 acre-feet, now 4 percent silted.

63. The proposed ^{1/}Tequepis earth fill dam would create a reservoir of 85,000 acre-feet capacity in the middle physiographic unit. Design and operation for flood control are possible in connection with the principal objective of water conservation. Cost of the dam is estimated at \$4,111,000 plus \$4,380,000 for a tunnel and water distribution lines.

64. The Santa Ynez River Water Conservation District was organized October 23, 1939 under the State Water Conservation Act approved in 1931, and embraces most of the watershed lands from Solvang to the Pacific Ocean.

65. Local Cooperation. The Santa Barbara County Board of Supervisors by resolution "agree to cooperate with federal agencies

1/ Quinton, Code and Hill. Engineering Report. Flood Control Through Conservation in Santa Ynez River, Calif. Prepared for Santa Barbara County. Dec. 19, 1938.

The first of these is the fact that the
the second is the fact that the
the third is the fact that the
the fourth is the fact that the
the fifth is the fact that the

The first of these is the fact that the
the second is the fact that the
the third is the fact that the
the fourth is the fact that the
the fifth is the fact that the
the sixth is the fact that the
the seventh is the fact that the
the eighth is the fact that the
the ninth is the fact that the
the tenth is the fact that the

The first of these is the fact that the
the second is the fact that the
the third is the fact that the
the fourth is the fact that the
the fifth is the fact that the
the sixth is the fact that the
the seventh is the fact that the
the eighth is the fact that the
the ninth is the fact that the
the tenth is the fact that the

in every practicable way as requested". The forest advisory committee of Santa Barbara County endorsed the flood control and water conservation project presented at the public hearing. The recently formed Santa Ynez River Water Conservation District mentioned above was organized with the express purpose of providing a responsible local agency to deal with federal and state representatives on flood control and related matters.

VI. BASIC FLOOD SOURCE AREAS

Location and Characteristics

66. Floods in the Santa Ynez watershed are the result of prolonged rainfall of moderate to heavy intensity. Snow in the high mountains is insufficient to have a significant effect on flood runoff.

67. Basic flood source areas are those portions of the drainage basin in which plant cover has been destroyed or is naturally sparse, resulting in extensive areas of bare soil and rock that contribute high surface runoff. Such conditions are found in three principal watershed areas, as follows: (1) burned areas of the upper watershed, largely within the national forest boundaries, (2) upper watershed areas of naturally sparse vegetation, in which there is a high rate of geologic erosion, and (3) cultivated and range lands of the middle and lower watershed units. All these areas are significant, and could be treated to reduce surficial runoff and erosion, thereby ameliorating flood conditions downstream. Possible treatments and their economy are discussed in Chapter VII.

68. Effects of the treatment would be a reduction in silt load

carried by the streams, protection of the areas themselves against accelerated erosion, promotion of surface water infiltration, and reduction of surficial runoff and overland flow, with consequent lowering of flood peaks. Greatest benefits of the upper watershed measures would be in the reduction of sedimentation rates in Gibraltar and Juncal reservoirs, and in other reservoirs proposed for construction downstream.

VII. REMEDIAL MEASURES

69. Among the remedial measures which will be given specific attention by areas, are:

Mountainous and Foothill Areas

A. Provide increased fire protection to the level determined as necessary by recent fire replanning studies, especially in the Juncal and Gibraltar watersheds and adjacent drainages downstream to the mouth of Cachuma Creek. This is vital to the solution of flood and water conservation problems and may require acquisition of some private lands to insure maximum fire protection.

Question ?
How
B. Reduce erosion on seriously eroding areas resulting from geologic conditions and watershed denudation by fire, by building upstream engineering structures as needed, and revegetating bare areas, especially in the Gibraltar and Juncal watersheds.

C. Stabilize erosion on range lands where local sore spots exist, by improved range management practices. A limited acquisition program may be required.

D. Control local areas of serious erosion along mountain roads, etc.

Agricultural Areas

E. Initiate soil and moisture conservation measures on areas that contribute to flood or sedimentation problems.

F. Install structures, including dams, training walls and revetments as needed to prevent valley trenching and bank cutting of the Santa Ynez River and tributaries in the middle and lower physiographic units.

Economic Considerations

70. Conservation of the flood waters which waste to the ocean is so important to Santa Barbara County that a combination of flood and erosion control with water conservation is most desired by local interests. Additional water for domestic and irrigation use is needed by the city of Santa Barbara and residents of the Goleta and Carpinteria agricultural areas. Although these districts lie outside the Santa Ynez watershed, this is their only source of additional water supplies that appears sufficient to meet the increased demands. Residents of these areas have stated that they are anxious to cooperate in a program to develop a supplementary source of water in this watershed and toward this end they are proposing an investigation of water resources and consideration of present and future water use by various areas dependent upon available supplies.

71. It has been estimated ^{1/} that a storage reservoir constructed on the Santa Ynez River at the Tequepis site just above the mouth of Cachuma Creek would eliminate 90% of the flood and siltation

^{1/} Quinton, Code and Hill. Engineering Report. Flood Control through Conservation on Santa Ynez River, Calif. December 19, 1938. p. 27.

Published by the American Medical Association, 535 North Dearborn Street, Chicago, Ill.

Subscription price, \$5.00 per annum in advance.

Entered as second-class matter, May 2, 1917, under post office number 384, at Chicago, Ill., under special agreement of post office and postmaster.

Acceptance for mailing at special rate of postage provided for in Act of October 3, 1917, authorized on May 1, 1919.

Postmaster: This journal is published weekly, except on Sundays and public holidays.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published by the American Medical Association, 535 North Dearborn Street, Chicago, Ill.

Copyright, 1919, by American Medical Association.

Printed by the American Medical Association, Chicago, Ill.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

The journal is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

It is published for the American Medical Association, which is not responsible for the views or opinions expressed by its members.

damages in the middle and lower watershed units. This reservoir would store about 85,000 acre-feet of water, reported to be sufficient to allow diversion of approximately 14,000 acre-feet of water annually without injury to, or interference with, the appropriative and riparian rights of water owners below the dam. The cost of this storage reservoir and aqueduct for diversion was estimated to be less than the value of the conserved water and the benefits to be derived from flood and siltation damage reduction.

72. A program to protect and restore natural cover, prevent soil erosion, retard runoff and silt movement, reduce flood flows and siltation damages, is believed to be technically feasible and economically justifiable, even though it is recognized that the geology of the area is such that complete control of erosion and debris movement may not be possible of accomplishment at the present time.

VIII. RECOMMENDATIONS

73. The preliminary examination of this watershed has indicated that a serious flood problem exists, and that remedial measures can be applied upstream and downstream which will reduce runoff, retard waterflow, and prevent soil erosion, and that such measures are economically justifiable.

74. It is therefore recommended that a detailed survey be immediately authorized, and that requirements for water conservation by storage and spreading be given every consideration in the preparation of the detailed survey report.

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF THE HISTORY OF ARTS AND ARCHITECTURE

OFFICE OF THE DEAN

1100 EAST 58TH STREET, CHICAGO, ILLINOIS 60637

TEL: 773-936-5000 FAX: 773-936-5001

WWW.HA.AU.CHICAGO.EDU

1999-2000 ACADEMIC YEAR

OFFICE OF THE DEAN

1100 EAST 58TH STREET, CHICAGO, ILLINOIS 60637

TEL: 773-936-5000 FAX: 773-936-5001

WWW.HA.AU.CHICAGO.EDU

1999-2000 ACADEMIC YEAR

OFFICE OF THE DEAN

1100 EAST 58TH STREET, CHICAGO, ILLINOIS 60637

TEL: 773-936-5000 FAX: 773-936-5001

WWW.HA.AU.CHICAGO.EDU

1999-2000 ACADEMIC YEAR

OFFICE OF THE DEAN

1100 EAST 58TH STREET, CHICAGO, ILLINOIS 60637

TEL: 773-936-5000 FAX: 773-936-5001

WWW.HA.AU.CHICAGO.EDU

1999-2000 ACADEMIC YEAR

OFFICE OF THE DEAN

1100 EAST 58TH STREET, CHICAGO, ILLINOIS 60637

TEL: 773-936-5000 FAX: 773-936-5001

WWW.HA.AU.CHICAGO.EDU

1999-2000 ACADEMIC YEAR

OFFICE OF THE DEAN

1100 EAST 58TH STREET, CHICAGO, ILLINOIS 60637

TEL: 773-936-5000 FAX: 773-936-5001

WWW.HA.AU.CHICAGO.EDU



Rugged terrain of Juncal watershed is typical of upper Santa Ynez basin. Erosion is active on mountains made barren by destruction of chaparral cover by Matilija fire in 1932. Juncal reservoir in center.



Chaparral and grassland areas of middle watershed, looking north from Santa Ynez Peak. Fault scarps, rugged topography, and local erosion sore spots are characteristic. Site of proposed Tequepis dam in center, above mouth of Cachuma tributary.



Steep escarpments and weathered shale outcrops of Gibraltar watershed slough off constantly, causing normally high rates of debris production from these areas even when plant cover is undisturbed. These outcrops contribute appreciably to the debris delivered from hillside sore spots to form deltas (right foreground) of large magnitude in the reservoirs below.



Talus slopes in need of stabilization by small engineering structures and planting.

Burned Areas



Severe erosion second year after forest fire, in Mono drainage. Soil loss estimated 184,000 cu. yds. (114 A. ft.) per square mile. Indian Canyon burn of 1933, Gibraltar watershed.



Erosion is still active under depleted chaparral cover 16 years after fire. Oso burn of 1923, Gibraltar watershed.



Delta at head of Gibraltar reservoir, main Santa Ynez River, was over a mile long in 1934. Watershed area 202 square miles, 72% burned over 1920-39.

Silting rate 1.38 acre-feet per square mile per year 1921-34, a 27% loss of storage capacity. Elevation of water surface 1347 feet, July 28, 1934.



Rapid advance of same delta 5 years later.

Silting rate 1.46 acre-feet per square mile per year 1920-38, a 37% storage loss in 18 years. Elevation of water surface 1352 feet, June 30, 1939.

Reservoir Silting



Sediment-filled basin of Mono debris dam, completed in December 1936, to protect Gibraltar reservoir from silting. Debris content 624 acre feet deposited in 2 winters, plus unknown quantity lost over spillway.

Watershed area 129 square miles, 67% burned over from 1911-39. Silting rate more than 2.4 A. ft. per sq. mi. per year. June 27, 1939



Agua Caliente debris dam, completed for same purpose December, 1937 on another Gibraltar tributary, holds 174 acre-foot delta deposited in first winter, amounting to 36% storage loss.

Watershed area 33 square miles, 52% burned-over 1923-39. Silting rate 5.3 A. ft. per sq. mi. per year. June 27, 1939.

Reservoir Silting



Delta at head of Juncal Reservoir, main Santa Ynez River, 8 years after dam construction. Watershed area 99% burned-over in 1932. Storage loss 299 acre-feet, 4% of original capacity. Silting rate 2.12 acre-feet per square mile per year.



Locally severe erosion of mountain roads contributes sediments to reservoirs. Improvement of drainage and stabilization of slopes is needed.

Flood Damage



Photo from Exhibit 4, Lompoc Flood Control Hearing.
Inundation of agricultural lands in Santa Ynez valley below Lompoc, by flood of March, 1938. Looking north along Renwick Avenue from Southern Pacific Railroad.



Flood Damage



Photo from Exhibit 4, Lompoc Flood Control Hearing.
Bank cutting by Santa Ynez River in Lompoc Valley, after flood of 1914.
Cantlay Cut (farm lots 28 and 29), looking east along Central Avenue.



Photo from Exhibit 4, Lompoc Flood Control Hearing.
Flood damage to Southern Pacific Railroad tracks, after 1907.
flood, looking west from near Renwick Avenue. Lower Santa Ynez
Valley, below Lompoc.

1. The first part of the paper is devoted to a general
description of the country and its resources.

2. The second part of the paper is devoted to a
description of the country and its resources.



Typical erosion of grain field in lower Santa Ynez watershed, result of incorrect cultivation practices. Terracing, contour cultivation and small engineering structures are needed to prevent this. View from Buellton road, 5 mi. E. of Lompoc.



Retirement of certain soil types from cultivation, and reestablishment of native grass or shrub cover, is required to prevent erosion and rapid runoff that increases Santa Ynez flood flows. Cabada Canyon, $6\frac{1}{2}$ mi. NE of Lompoc.

SANTA YNEZ WATERSHED

CALIFORNIA

Santa
Maria

SANTA MARIA RIVER
WATERSHED

SAN RAFAEL RANGE

• Surf

Lompoc
LOWER UNIT

MIDDLE UNIT

Buellton

Santa Ynez
Solvang

UPPER UNIT

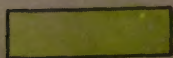
VENTURA RIVER
WATERSHED

Pt. Arguello

SANTA YNEZ RANGE
Montecito

Santa
Barbara

LEGEND



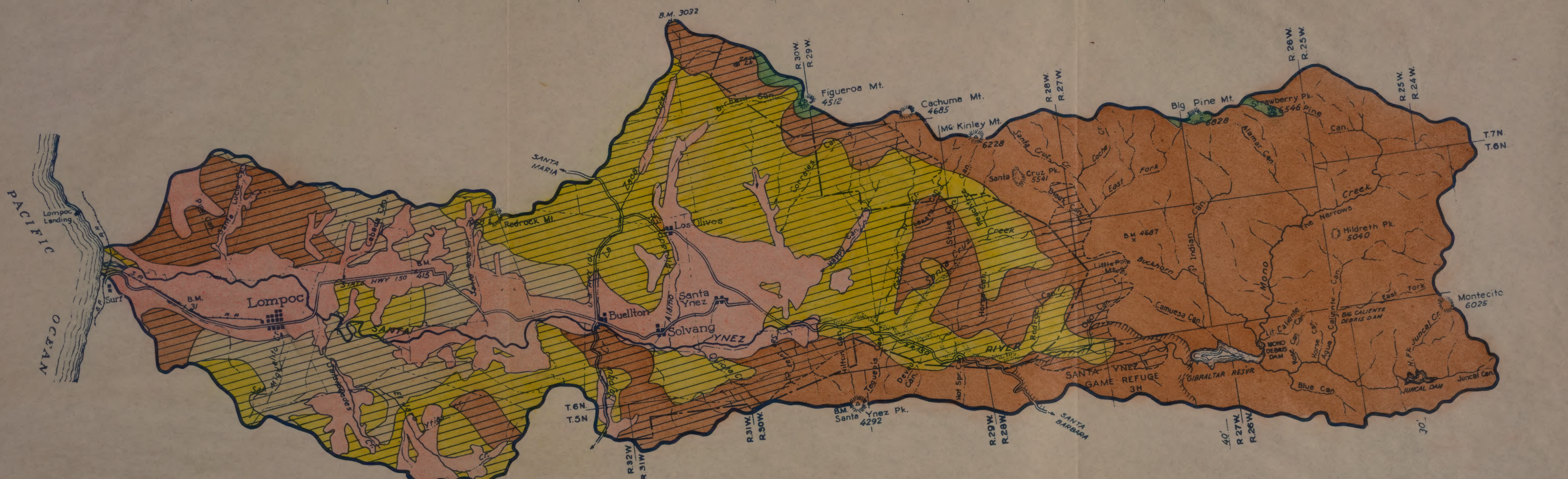
Area within Los Padres Nat'l. Forest

SANTA BARBARA CHANNEL



File 316

MAP 1

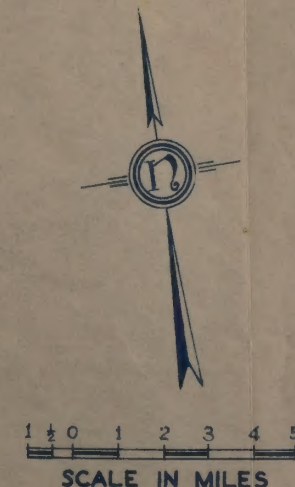


LEGEND

- Watershed Boundary
- Boundary Los Padres Nat'l. Forest
- Main Motor Highway

NATURAL COVER & LAND USE

	SQ. MI.	% of WTSHD.
Grassland, oak-woodland, grass	217	24
Chaparral	452	51
Barren	1	-
Pine & Pine fir	4	-
Sagebrush	58	7
Cultivated	158	18
	890 sq mi	100%
Grazing - Cattle	425 sq mi	48 %



U.S. DEPARTMENT OF AGRICULTURE
FLOOD CONTROL PUBLIC NO. 738
Field Coordinating Committees 18 & 20
E. I. Kotok, Harry E. Reddick - Co-Chairmen

SANTA YNEZ RIVER

CALIFORNIA
DRAINAGE AREA 890 SQ. MI.

NATURAL COVER AND LAND USE

SOURCE OF DATA: USFS, Forest Survey - C.F. & R.E.S.; Field Examination
COMPILED: MEA-USFS - 5/19/39
TRACED: F.F.B. - 7/2/39
CHECKED: A.W.L. - 7/39

APPROVED
PRELIMINARY EXAMINATION
FILE No. F.C. - 268
MAP NO. 2



LEGEND

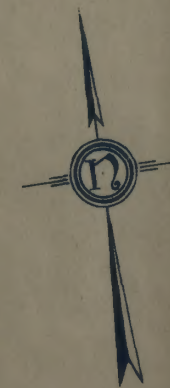
	Watershed Boundary
	Boundary Los Padres Nat'l. Forest
	Main Motor Highway
	Burned 1 Time
	Burned 2 Times
	Burned 3 Times

Total Area individual burns	307	34
Total Area burned	287	32

SOURCE OF DATA

- Los Padres N.F. Fire History Records 1911-38
 Santa Barbara Co. Dept. of Forestry 1929-38

No data available for accurate delineation of these burned areas.
 Burned areas under 40 acres not shown in National Forest.



SCALE IN MILES

U.S. DEPARTMENT OF AGRICULTURE
FLOOD CONTROL PUBLIC NO. 738
 Field Coordinating Committees 18 & 20
 E. I. Kotok, Harry E. Reddick - Co-Chairmen

SANTA YNEZ RIVER
 CALIFORNIA
 DRAINAGE AREA 890 SQ. MI.

FIRE HISTORY

SOURCE OF DATA See list at left		COMPILED: -USFS-CF & RES - 7-'39 TRACED: -ERK- JULY 31-'39 CHECKED: -AWL - MAY 20-'40	
APPROVED		PRELIMINARY EXAMINATION	MAP NO. 3
		FILE No. F.C. - 266	

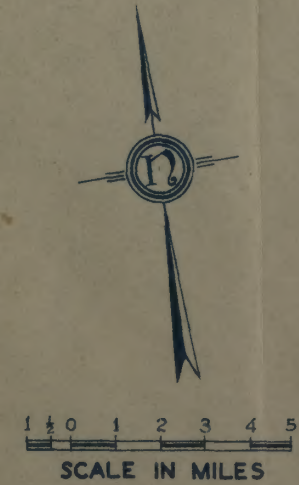
PACIFIC OCEAN

LEGEND

- Watershed Boundary
- Boundary Los Padres Nat'l. Forest
- Main Motor Highway

High Quality Cultivated Land Eroded or Flooded - 1938 - 3981 Acres
Submarginal Cultivated Land Eroded or Flooded - 1938 - 506 Acres
Note: Serious bank erosion exists locally throughout entire length of Santa Ynez River and principal tributaries

- Precipitation Stations (Standard) (Intensity)
- Stream Gaging Stations
- Proposed Intensity Precipitation Station by U.S.W.B.



U.S. DEPARTMENT OF AGRICULTURE
FLOOD CONTROL PUBLIC NO. 738
Field Coordinating Committees 18 & 20
E. I. Kotok, Harry E. Reddick - Co-Chairmen

SANTA YNEZ RIVER
CALIFORNIA
DRAINAGE AREA 890 SQ. MI.

FLOODED AREAS
LOCATION OF
PRECIPITATION & STREAM GAGING STATIONS
AND
ISOHYETALS OF AVERAGE ANNUAL RAINFALL

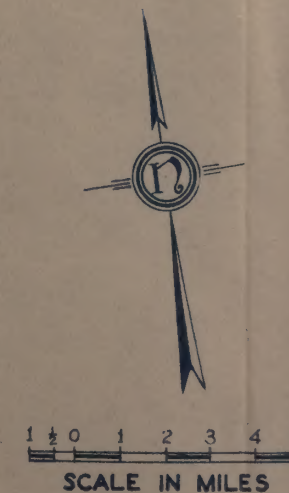
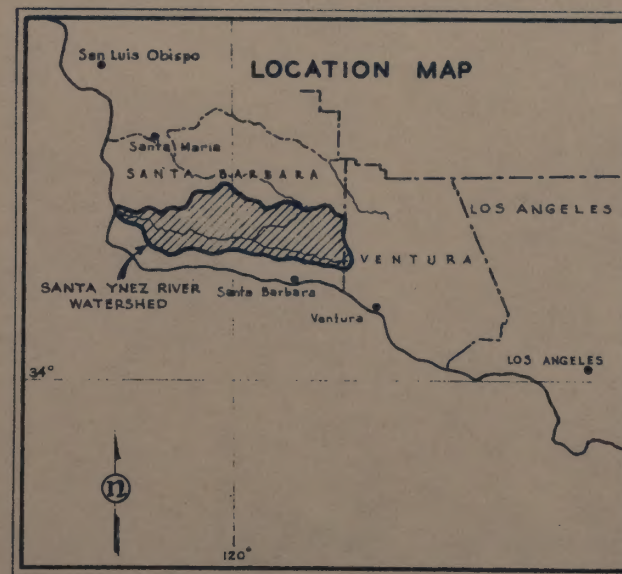
SOURCE OF DATA: Santa Barbara Co. Rd. Dept. Quinton, Code & Hill-Cons. Engrs., L.A. Calif.; U.S.W.B.
COMPILED: B.A.E., U.S.F.S., H.J.F.
TRACED: F.E.B., Nov. 2, '39
CHECKED: AWL, Nov. 2, '39

APPROVED
PRELIMINARY EXAMINATION
FILE No. F.C. - 320
MAP NO. 4



LEGEND

- Watershed Boundary
- - - Boundary Los Padres Nat'l. Forest
- Main Motor Highway
- Local Occurrence
- Serious erosion on chaparral area, caused by fire. Excessive erosion debris and high runoff.
- ▨ Erosion becoming partially stabilized on burned areas. Moderate contribution of sediments.
- ⊕ Highly active geologic erosion. Steep escarpments, unstable material. High contribution of silt and sand.
- ① Serious erosion on range lands. Generally overgrazed. Runoff concentrated in gullies. Excessive erosion debris.
- ② Serious erosion on cultivated slopes. High contribution of sand and excessive runoff.
- Moderate erosion on cultivated lands. Damage primarily to land itself, with secondary effects on floods.



U.S. DEPARTMENT OF AGRICULTURE
FLOOD CONTROL PUBLIC NO. 738
 Field Coordinating Committees 18 & 20
 E. I. Kotok, Harry E. Reddick - Co-Chairmen

SANTA YNEZ RIVER
 CALIFORNIA
 DRAINAGE AREA 890 SQ. MI.

CRITICAL AREAS

SOURCE OF DATA	RECONNAISSANCE	CONSERVATION SURVEY	COMPILED H.M.G. & J.H.G. 6-21-39	TRACED E.R.K. 7-31-39	CHECKED A.W.L. 7-31-39
APPROVED			PRELIMINARY EXAMINATION		MAP NO. 5
			FILE No. F.C. - 269		

APPENDIX A

APPENDIX A

(List of the most important sources of factual information used in Report)

Lompoc Flood Control Hearing, December 20, 1938

U. S. Census, 1930

U. S. Census of Agriculture, 1935

Fire Records of Los Padres National Forest

Fire Records of Santa Barbara County Forestry Department

Santa Barbara City Water Department

Corps of Engineers, U. S. Army, Preliminary Examination Report, Santa Ynez River, July 26, 1939

Flood Investigation Report, Santa Barbara County Road Department

Soil Conservation Service, Lompoc Project

Farm Security Administration

Farm Credit Administration

Agricultural Adjustment Administration

Santa Barbara County Planning Department

Montecito County Water District

Santa Ynez Water Conservation District

Engineers' Report "Flood Control Through Conservation,"
Santa Ynez River - Quinton Code and Hill-Leeds and Barnard

Report on "Proposed Erosion Checks" - Olmsted and Aiken,
August 1934

Report "Debris Dams Supplemental to Mono Dam for Protection of Gibraltar Reservoir" - by Garfield Stubblefield, U. S. Forest Service.

Report "Plan for Prevention of Silting of the Gibraltar Reservoir by Construction of Check Dams or Debris Storage Dams" by E. W. Kramer, Regional Engineer, U. S. Forest Service

Geologic Map of California, State Bureau of Mines

Vegetation Type Maps, Forest Survey, California Forest and
Range Experiment Station

Soil Survey of the Santa Ynez Area, U. S. Bureau of Chemistry
and Soils

Siltation of Reservoirs by Eakin and Brown, Revised August 1939

University of California, Agricultural Experiment Station

University of California, Agricultural Extension Service

APPENDIX B

NOTICE OF PUBLIC HEARING

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
751 South Figueroa Street,
Los Angeles, California.

November 21, 1938.

A public hearing will be held at Lompoc, California, in the Veterans' Memorial Building, at 10:00 a.m., Tuesday, December 20, 1938, concerning preliminary examination of Santa Ynez River and tributaries, California, with a view to control of floods, water conservation, soil erosion prevention, etc., in accordance with Congressional Act of June 28, 1938, Public No. 761. Copy of afore-said act, together with information concerning flood control public hearings to be held in connection therewith, are attached.

/s/
Theodore Wyman, Jr.,
Major, Corps of Engineers,
District Engineer.

INFORMATION CONCERNING FLOOD CONTROL PUBLIC HEARINGS

1. All interested parties are invited to submit plans or descriptions of improvements desired and to be present or to be represented at the flood control public hearing announced in attached notice, particularly those interested in the control of floods and the protection of watershed values, and the officials of any county, city, town or local association whose interests may be affected by the improvements desired. They will be given an opportunity to express their views upon the suitability and adequacy of said improvements with reference to the control of floods, run-off and waterflow retardation, soil erosion prevention, and the maintenance of vegetative cover, and to suggest changes therein that they may consider desirable. Water supply and conservation, and water power, in conjunction with flood control or any of the foregoing, will be considered.

2. The following flood control information is requested:

a. Description in detail of the character and location of the improvements desired and their approximate estimated cost.

b. Full information as to the extent and character of areas threatened by, or subject to floods, including monetary value and productivity of said areas.

c. The economic and other justification for the expenditures that may be entailed by the desired improvements, based upon: Saving of life and protection to property, improvement to drainage, conservation of water, the development of power, and benefits to navigation, if any.

d. Description of floods, their frequency and severity, and damages that have been inflicted thereby.

e. The monetary value of benefits expected to accrue to lands, public and private property, utilities, business activities and other interests from the desired improvements.

f. Any other information that may be pertinent to the question of flood control of the stream or streams.

3. The Act of Congress, copy of which is attached to notice of public hearing, requires certain items of local cooperation. In this connection, the following are requested:

a. Resolution, by responsible body or agency, that the items of local cooperation called for by the aforesaid act, relative to water conservation, will be complied with. This resolution should state, if practicable, the time within which said items of cooperation will be fulfilled, after notification, provided a project for the

proposed improvements is adopted by Congress, and give the authority under which said responsible body or agency functions and under which it can so cooperate.

b. If said resolution cannot be submitted until later, a letter should be submitted so stating and explaining the situation.

c. If no local cooperation is to be expected, a letter to this effect should be submitted, with explanations, as soon as practicable.

d. If only partial fulfillment of aforesaid required items of cooperation is expected at this time, such should be reported by letter. This letter should specify the items that can be fulfilled and give the time within which the requirements of said items will be complied with, after notification as per foregoing subparagraph 3 a. The letter should also specify any other cooperation and/or contribution which the United States may expect from local interests toward the cost of the desired improvements, or in construction, at local expense, of complementary works.

4. The following information is requested concerning watershed conditions and their relation to floods and their control:

a. Description of the extent and nature of soil erosion, accelerated run-off, and depletion of forest and vegetative cover.

b. Full information concerning the effects of present or impending injurious watershed conditions on livestock, forage and timber production, availability of surface and subsurface waters, regulation of water-flow, improvement to drainage, accumulation of silt, soil fertility, saving of life, and protection to property, or on any other watershed values.

c. Description in detail of the watershed program desired and needed.

d. The monetary value of benefits based on past and future uses expected to accrue to lands, public and private property, utilities, business activities, agricultural and other interests from the desired watershed program; also the improvement in the condition of the rural and urban populations which are dependent on the watershed resources. The economic and other justification for the expenditures that may be entailed in any proposed watershed program based upon the above information.

5. Section 4 of the Act of August 28, 1937, calls for certain items of cooperation in connection with soil conservation, and water-flow retardation, as follows:

"Sec. 4. * * * As a condition to the extending of any benefits, in prosecuting measures for run-off and water-flow retardation and soil erosion prevention authorized by Act of Congress pursuant to the policy declared in this Act, to any lands not owned or controlled by the United States or any of its agencies, the Secretary of Agriculture may insofar as he may deem necessary for the purpose of such Acts, require--

"(1) The enactment and reasonable safeguards for the enforcement of State and local laws imposing suitable permanent restrictions on the use of such lands and otherwise providing for run-off and water-flow retardation and soil-erosion prevention;

"(2) Agreements or covenants as to the permanent use of such lands; and

"(3) Contributions in money, services, materials, or otherwise to any operations conferring such benefits."

In this connection, local interests should be prepared at the hearing to present their desires and state whether they are prepared and willing to fulfill the above-mentioned items of cooperation.

6. Oral statements will be heard, but for accuracy of record all important facts and arguments pertaining to paragraphs 2, 3, and 4, should be submitted in writing, as the records of the hearing will be forwarded for consideration by the War Department and the Department of Agriculture. Written statements under each paragraph may be handed to the undersigned at the hearing, or preferably mailed to him beforehand. Seven copies of all written matter and exhibits should be submitted.

/s/

Theodore Wyman, Jr.,
Major, Corps of Engineers,
District Engineer.

LIST OF PERSONS PRESENT AT PUBLIC HEARING
AT LOMPOC, CALIFORNIA, CONCERNING FLOOD
CONTROL OF SANTA YNEZ RIVER AND
TRIBUTARIES, DECEMBER 20, 1938

BEFORE:

Captain N. A. Matthias, Presiding Officer, United States
Engineer Office, Los Angeles, California.

APPEARANCES:

Lieutenant William A. Gay, United States Engineer Office,
Los Angeles, California
Mr. G. B. Bebout, Principal Engineer, United States Engineer
Office, Los Angeles, California.
Mr. E. C. LaRue, Engineer, United States Engineer Office,
Los Angeles, California.

Mr. Howard G. Walters, Assistant Engineer, United States
Engineer Office, Los Angeles, California.
Mr. L. A. Markel, Associate Engineer, United States Engineer
Office, Los Angeles, California.

PRESENT:

Mr. Henry J. Abels, Santa Barbara County Forestry Department,
Santa Maria, California.
Mr. Frank Adams, Representing College of Agriculture and
State Division of Water Resources, University of
California, Berkeley, California.
Mr. L. A. Adam, Director Santa Maria Water Conservation District
Santa Maria, California.
Mr. Ronald M. Adam, County Supervisor, Lompoc, California.
Mr. Jack Alexander, Irrigation--Wells and Pumps, 220 East
Cypress, Lompoc, California.
Mr. Jim Alexander, Ranch Manager, Box 758, Lompoc, California.
Ursula Alexander, Voter, Lompoc, California.
Mr. Elmer M. Awl, Manager Rancho Juan y Lolita, 270 Coldspring
Road, Santa Barbara, California.
Mr. A. H. Ball, Carpenter, 112 North D Street, Lompoc,
California.
Mr. Robert J. Batty, Farmer, Buellton, California.
Mr. F. H. Beattie, General Farming, Land Owner, Lompoc,
California.
Mr. H. E. Beattie, Farmer, R.F.D. Box 63, Lompoc, California.
Mr. James H. Beattie, General Farming, R.F.D. No. 1, Box 63,
Lompoc, California.
Mr. John Beattie, Farmer, Lompoc, California.

Mr. Ernest Bondietti, Farmer, Post Office Box 673, Lompoc, California.

Mr. R. N. Brink, Junior Bridge Engineer, State of California, 115 North G Street, Lompoc, California.

Odin G. Buell, Rancher, Buellton, California.

Mr. A. H. Cooley, Member of Santa Barbara City Water Commission, 118 East Dela Guerra Street, Santa Barbara, California.

Mr. William H. Cooper, Rancher, R.D. No. 1, Lompoc, California.

Mr. Frederick H. Cowles, Representing Democratic Central Committee of Santa Barbara County and Forestry Fellowship as president of same, 51 Alameda Padre Serra, Santa Barbara, California.

Mr. L. D. Davenport, Civil Engineer, Hope Ranch, Santa Barbara, California.

Mr. Charles A. Davis, Farmer, Box 266, Lompoc, California

Mr. William S. Dolliver, Assistant District Maintenance Engineer, State of California, District V, Division of Highways, San Luis Obispo, California.

Mr. T. F. Donovan, Farmer, Lompoc, California.

Mr. J. F. Donovan, Jr., Farmer, Lompoc, California.

Mr. C. H. Doty, Farmer, R.F.D., Lompoc, California.

Mr. Henry Doty, Rancher, Buellton, California.

Mr. D. M. Douglass, Farmer, Lompoc, California.

Mr. Frank E. Dunne, County Forester, Court House, Santa Barbara, California.

Mr. W. P. Dyer, Rancher, Box 27, Lompoc, California.

Mr. C. O. Elliger, Division of Fish and Game, State of California, Ferry Building, San Francisco, California.

Mr. Peter M. Flanagan, Farmer, Gaviota, California.

Mr. George V. Footman, Midland Counties Public Service Corporation, Santa Maria, California.

Mr. Walter S. Franklin, Chairman, County Planning Commission, 22 West Micheltorena Street, Santa Barbara, California.

Mr. Frank S. Fatis, Farmer, Lompoc, California.

Mr. H. V. Gags, Johns-Manville Products Corporation, 706 West Ocean Avenue, Lompoc, California.

Mr. Eldon Gilkerson, Farmer, Lompoc, California.

Mr. Fred J. Gillett, Farmer, Lompoc, California.

Mr. H. B. Graves, Surveyor, Union Sugar Company, Betteravia, California.

Mr. Reg A. Hamblin, Lompoc Manager Shell Oil Company, 123 North E Street, Lompoc, California.

Mr. D. P. Hansen, Buellton, California.

Mr. C. Kelley Hardenbrook, Attorney, Lompoc, California

Mr. Edward E. Haskell, Engineering Contractor, 118 State Street, Santa Barbara, California.

Mr. R. E. Heiges, Retired Physician and Mayor, 126 North H. Street, Lompoc, California.

Mr. A. B. Henning, Farmer, R.F.D. 56, Lompoc, California.

Mr. C. W. Henning, Farmer, 119 South B Street, Lompoc, California.

Mr. Guy Hibbits, Farmer, Lompoc, California.
Edith C. Hilburn, Farming, DeWolf Avenue, Lompoc, California.
Mr. Jim Hilburn, Farmer, DeWolf Avenue, Lompoc, California.
Mr. Leonard M. Hill, Assoc. Agri. Econ, Bureau of Agricultural Economics, U.S.D.A. Berkeley, California.
Mr. Raymond A. Hill, Consulting Engineer to County of Santa Barbara, 905 Edison Building, Los Angeles, California.
Mr. W. F. Hoag, W. Atlee Burpee Seed Company, Floradale Farms, Lompoc, California.
Mr. Graham Hollister, Hollister Estate Company, Ranching, 911 Chapala Street, Santa Barbara, California.
Mr. R. P. Houk, Farmer, Lompoc, California.
Mr. E. L. Hudson, Real Estate, Corner Cypress and G Streets, Lompoc, California.
Mr. L. C. Husinan, Banker, Lompoc, California.
Mr. Earl T. Jensen, Rancher, Solvang, California.
Mr. J. Q. Jewett, Engineer, Quinton, Cook & Hill -- Leeds and Barnard, for County of Santa Barbara, 905 Edison Building, Los Angeles, California.
Mr. John F. Johnston, Soil Conservation Service, Santa Paula, California.
Mr. Eugene S. Kellogg, County Agricultural Commission, Santa Barbara, California.
Mr. C. J. Kraebel, U. S. Forest Service, 331 Giannini Hall, University of California, Berkeley, California.
Mr. Presley Lancaster, Jr., Secretary, Santa Barbara Chamber of Commerce, Santa Barbara, California.
Mr. Manuel Laranjo, Farming, R.F.D. Box 89, Goleta, California.
Mr. John H. Lawrence, Phelan Building, San Francisco, California.
(United States Forest Service)
Mr. George Learned, Jr., Reporter, Santa Barbara News Press, 913 North O Street, Lompoc, California.
Mr. Earl Macklin, Patrol Captain, Bureau of Patrol and Law Enforcement, Division of Fish and Game, Post Office Box 66, Santa Barbara, California.
Mr. Chris Madsen, Farmer, Box 89 R.F.D., Lompoc, California.
Mr. Patrick J. Maher, Mayor, City Hall, Santa Barbara, California.
Mr. R. B. McClellan, Ranching, 321 West Walnut Avenue, Lompoc, California.
Mr. Henry McGee, Ranch Manager, Packard Ranch, 223 South H Street, Lompoc, California.
Mr. Robert McGregor, Farmer, Buellton, California.
Mrs. Robert McGregor, Housewife, Buellton, California.
Mr. R. R. McGregor, Rancher, Buellton, California.
Laura McLaughlin, Farming, Lompoc, California.
Mr. Harold W. Mercer, Farmer, Buellton, California.
Mr. M. B. O'Brien, Farming, Guadalupe, California.
Mr. E. F. Ogborn, Manager Union Sugar Company, Betteravia, California.
Mr. Owen H. O'Neill, County Engineer, County Planning Commission, Court House, Santa Barbara, California.
Mr. Herb Orriss, News-Press, Santa Barbara, California.
Mr. Allen D. Owen, Rancher, R.F.D. Box 154, Lompoc, California.

Mr. George D. Owen, Rancher, Lompoc, California.
Mr. F. M. Parks, Vegetable Farming, Lompoc, California.
Mr. W. C. Penfield, Engineer Public Works, Santa Barbara
County, Santa Barbara, California.
Mr. Henry G. Petersen, Rancher, Solvang, California.
Mr. C. W. Petit, Soil Conservation Service, Santa Paula,
California.
Mr. A. C. Postel, Attorney, Box 630, Santa Barbara, California.
Mr. S. Paul Reed, Farmer, President Lompoc Farm Bureau, Lompoc,
California.
Mr. William A. Rennie, Rancher, Lompoc, California.
Mr. A. C. Rhodes, Farmer, Lompoc, California.
Mr. A. L. Richardson, Resident Engineer, Bridge Department,
Division of Highways, State of California, Post Office
Box 1499, Sacramento, California.
Mr. Milton E. Risse, Farmer, Buellton, California.
Mr. Clarence Ruth, District Superintendent Elementary School,
230 North G Street, Lompoc, California.
Mr. Emmett Schuyler, Farming, Box 105, Lompoc, California.
Mr. Milton Schuyler, Farmer, 307 East Ocean Avenue, Lompoc,
California.
Mr. J. Edward Sheehy, State Bridge Department, Post Office
Box 157, Lompoc, California.
Mr. Ryuichi Hirasi, Farmer, Lompoc, California.
Mr. Jan Sinclair, care of Bodes Seeds, Ltd., Box A, Lompoc,
California.
Mr. Delbert D. Smith, Supt., Water Dept., City Hall, Santa
Barbara, California.
Mr. E. F. Smyth, County Farm Advisor Office, Agricultural
Extension Service, U.S.D.A., Santa Barbara, California.
Mr. Sam F. Stanwood, Supervisor, Santa Barbara, California.
Mr. F. G. Stevens, County Supervisor and Farmer, Santa Barbara,
R.D. No. 1, California.
Mr. L. D. Streeter, Farmer, R.F.D. 1-117, Lompoc, California.
Mr. H. C. Stull, Southern Pacific Company, Assistant Engineer,
San Francisco, California.
Mr. R. E. Sudden, Farming and Cattle, 303 South H Street,
Lompoc, California.
Mr. Buck Summers, Farmer, Lompoc, California.
Mr. Neil Thom, Jr., Civil Engineer, representing College of
Agriculture at University of California and State Division
of Water Resources, Los Angeles, California.
Mr. L. Deming Tilton, County Planning Commission, Santa Barbara,
California.
Mr. Samuel L. Ullman, Draftsman, Santa Barbara County Road
Department, Court House, Santa Barbara. (238 Stanley
Drive, Santa Barbara, California.)
Mr. R. C. Westwick, County General Road Superintendent, Court
House, Santa Barbara, California.
Dr. Irving Mills, Surgeon, Santa Barbara Clinic, Santa Barbara,
California.

Mrs. Raymond M. White, Librarian, 205 North I Street, Lompoc,
California.
Mr. William Zuolanek, Post Office Box, 142, Lompoc California.
(Seed Grower).

